

W2
A5
N92g

20B

Mare Island, California
3 March 1948

Committee on Artificial Limbs
National Research Council
2101 Constitution Avenue
Washington, D. C.

DOCUMENTS SECTION

MONTHLY REPORT OF THE EXPERIMENTAL WORK AT THE ARTIFICIAL
LIMB SHOP, MARE ISLAND NAVAL HOSPITAL

During the month of February, the billet for a draftsman has been filled and the billet for an engineer is being reclassified and submitted to the Civil Service Commission.

The following projects are being worked on:

1. Functional Ankle Joint:

At the present time there are over sixty functional ankle joints installed and undergoing field testing. The $1\frac{1}{2}$ " plywood ankle block is proving satisfactory and has corrected the occurrence of splits through the grain of the wood which occurred with the old type block. Mr. McKendrick has submitted plans for a new type ankle joint utilizing the Adel Halfco Spherical Contact Bearing for the ball and socket. It appears to have merit and possible improvement over the original ankle joint and we intend to set up a number of ankles for examination.

2. Suction Socket:

(a) Above Knee: At the present time we have fitted over sixty suction sockets which are undergoing field testing. The results to date have shown that about 10% of cases fitted do not utilize their suction socket limb.

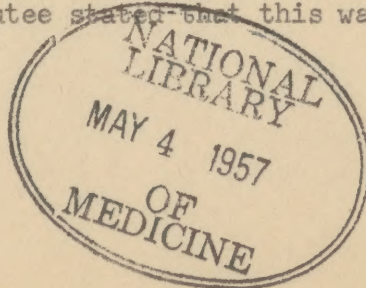
(b) Below Knee: Work continues on the redesign of the BK suction socket.

(c) Below Elbow: A flexible plastic bucket with aluminum inserts for strength together with a soft liner and a circular sponge rubber ring inside the rim of the bucket has been designed. This combination seems to hold promise for the below elbow amputee.

(d) Above Elbow: Above elbow stumps are easily fitted for suction socket and results in evaluations are similar to those that occur in AK suction sockets.

3. Cineplastic Arms:

Two new plastic buckets are fitted to Hans Schuffenhauer's arms. An additional below elbow prosthesis has been fitted utilizing the cineplastic motors for control of the hand lock. The amputee stated that this was the best combination he has had to date.



4. Pronator-Supinator for Above Elbow:

The latest design of the pronator-supinator is an improvement and amputees utilizing this mechanism state they are finding more use for it every day. We believe that pronation and supination for abilateral above elbow is a necessity. In a unilateral above elbow amputee it is less than a necessity because he still has the use of his normal remaining arm. The same type of mechanism is readily installed in a below elbow arm and allows any type of stump except wrist disarticulation to utilize it. As a rule wrist disarticulation has excellent pronation supination in their stumps and a mechanical device is not needed provided the wrist disarticular prosthesis does not restrict the stump's remaining function.

5. Robinson Hand and Cosmetic Glove:

Work is continuing on the redesign of the hand. Reports from field testing continue to be favorable. One of the gloves which was returned stained with carbon copy ink, was soaked in 10% Clorox for one week which completely removed the stains and apparently did not harm the glove.

6. Soft Buckets and Impression Methods for Below Knee Stumps:

A number of cases have been fitted with the soft buckets, whose stumps had circulatory deficiencies. These amputees had been previously fitted with the conventional hard buckets by competent limb fitters but were still unable to wear their legs because the stumps kept breaking down and were in danger of gangrene. After one week in a soft bucket circulation greatly improved and after a month's time the stump appeared relatively normal. These buckets were fitted in conjunction with functional ankles and it is our observation that both the soft bucket and functional ankle were instrumental in allowing these amputees to wear their prosthesis. One below knee Buerger's disease case is successfully wearing this type of a prosthesis even though at surgery the circulatory condition of the stump was very poor and required months before healing of the stump occurred prior to fitting. It has been our previous experience that this type of stump promptly breaks down in a hard bucket and requires amputation above knee.

7. Selectron with Fortisan Laminate:

Recently a female amputee was fitted with this plastic using only four layers of fortisan and a shin produced was very flexible and weighed less than $\frac{1}{2}$ pound. It appeared to be sufficiently strong for her use. The elasticity feature in the shin appears to be desirable as it allows the torques, stresses and strains to be taken up in the shin itself.

8. Production Methods for Limb Manufacturing:

Production studies are continuing.

9. Tilting Table Prosthesis:

Several redesigns have been made on the two tilting table prosthesis and it is our opinion that the hip joint must be functional in order to allow an amputee with a disarticulation at the hip to walk with a reasonable degree of skill.

10. Functional Joint for Elbow, Wrist and Hips:

Additional cases have been fitted with the new functional joints and open biceps cuffs and the amputees are unanimous in their opinion of its advantages of allowing the remaining function of their stumps to be utilized to their full extent. In the conventional type of prosthesis, much of the remaining functions are definitely restricted by the prosthesis.

11. Forged Aluminum Joints:

75 ST forge aluminum joints are being installed routinely and no breakage has been recorded. Examination of a set of joints that has been constantly worn daily for over a year reveals little or no wear or brinelling in the races.

12. Suction Socket Valves:

A new suction socket valve has been designed utilizing only one rubber gasket and a number of these valves are being fabricated in the machine shop.

13. Mechanical Knee Lock:

Work continues on the design of a mechanical knee lock.

14. Adel Hydraulic Leg:

The No. 1 model of the Adel leg is being worn by an amputee. It is now adjusted to the point where it is functioning in a satisfactory manner. The value of the cross linkage in allowing a double extension of the knee is lost; due to the method of aligning the leg in order to allow the amputee to walk with a normal gait. The weight factor in the present model prohibits its practical application in a short stump or a hip disarticulation.

15. Special Prosthesis:

A below elbow amputee who has departed for Alaska was fitted with a fleece lined bucket. This amputee had impaired circulation of his stump and suffered from mildly cold weather. It is felt that his stump will remain warm in this type of bucket, and will withstand the rigors of a frigid climate. Contact with this patient will be maintained.

16. Flexible Plastic:

A below knee lacer has been constructed from a flexible plastic laminated with nylon which appears to be a good substitute for leather. It apparently has all the desirable characteristics of leather plus the hygienic features of plastic.

17. Nylon Belting:

Five arm cases have been fitted utilizing nylon belting for shoulder straps. This is an improvement over the cotton webbing. The material is softer and conforms readily to the shape of the shoulders, is washable, and is stronger than the cotton webbing.

18. Parachute Nylon Shroud Cord:

A number of cases have been fitted with a prosthesis utilizing nylon parachute shroud cord in place of leather lacing. This material is a good deal stronger than the leather, ties easier in a knot, and is lighter. The ends of the cord have a tendency to unravel but this was overcome by dipping the ends in plastic which prevented unravelling and allowed the cord to be inserted through the eyelets more readily.

19. Plastic Leg Covering:

A female amputee was fitted with the dermiflex plastic leg covering which allowed her to wear sheer silk hose directly on the covering. Seams formed on the inside of the covering during fabrication. By placing the mold on a turntable while draining, the thickness of the plastic was uniform and no seams formed.

20. Functional Knee Joint:

Mr. McKendrick has submitted plans for a functional knee joint which allows rotation at the knee and utilizes the principle of the ball and socket similar to the ankle joint. These plans appear to have merit and we intend to set up some amputee on a combination functional ankle and knee joint. The biggest advantage of this type of knee joint appears to be a factor which allows the leg to self-align when the amputee walks on it. When the optimal alignment position occurs after walking the knee joint is then fixed in that position.

T. J. CANTY
Commander, (MC)USN
Officer in Charge
Artificial Limb Department

Forwarded Approved:

W. E. PERRY
Captain (MC)USN
Medical Officer in Command